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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/659,525	09/09/2003	Kenneth E. Hrdina	SP02-199P	4733

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CORNING INCORPORATED
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EXAMINER	
DEHGHAN, QUEENIE S	

ART UNIT	PAPER NUMBER
1731	

DATE MAILED: 09/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/659,525	HRDINA ET AL.	
	Examiner	Art Unit	
	Queenie Dehghan	1731	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) *22* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-21, drawn to a method for making an extreme ultraviolet optical element, classified in class 65, subclass 17.2.

   II. Claim 22, drawn to titania-containing silica glass body, classified in class 359, subclass 350.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions Group I and Group II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by another and materially different process such as chemical vapor deposition.

3. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

4. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

5. During a telephone conversation with Mr. Walter Douglas on August 23, 2006 a provisional election was made without traverse to prosecute the invention of Group 1, claims 1-21. Affirmation of this election must be made by applicant in replying to this Office action. Claim 22 is withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

6. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1 and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Clasen et al. (2002/0026810). Clasen et al. disclose a method comprising providing an aqueous sol including a solid phase of titania-containing powder, forming the sol into a titania-containing silica shaped gel having a homogenous distribution of titania ([0031],

[0033], [0034], [0047]), drying the gel ([0048]), and heating to form a glass body ([0041]). Regarding claim 12, Clasen et al. disclose the further mixing of the titania containing silica powder with an alkoxide containing titanium, as well as an alkoxide containing silica ([0034], [0043]), as indicated by the mixtures thereof.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clasen et al. (2002/0026810), as applied to claim 1 above, in view of Maxon et al. (5,970,751). Regarding claims 2 and 3, Clasen et al. briefly mentions forming glass by flame hydrolysis of silica and titania precursors ([0010]). Maxon et al. further

exemplifies the production of amorphous titania-containing silica powder by flame hydrolysis of organometallic precursors (col. 1 lines 41-44, 65 to col. 2 line 4, col. 2 lines 23-33, 62-65). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the flame hydrolysis process with organometallic precursors for making amorphous titania-containing silica powder, as demonstrated by Maxon et al. in the process of Clasen et al. in order to provide an environmentally friendly method to make relatively pure metal oxides. Regarding claims 4 and 5, Clasen et al. disclose making titanium oxide/silicate glass with a titania concentration of 7.4wt%. As previously mentioned, Maxon et al. disclose a process for making titania-containing silica powder, which is collected in a cup and used for further processing (col. 2 lines 32-33). Although Maxon et al. do not teach the titania content of the powder, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the powder making method of Maxon et al. to obtain the desired 7.4wt% titania content in the powder and subsequently the glass body resulting for use of the powder, as disclosed by Clasen et al. in order to produce the desired low CTE in the finished glass body.

5. Claims 6-7 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clasen et al. (2002/0026810) in view of Maxon et al. (5,970,751), as applied to claim 4 above, in further view of Nordberg (2,236,059). Regarding claims 6-7, Clasen et al. fail to disclose a CTE in the range of about +10ppb/°C to –10ppb/°C. Nordberg teaches a TiO_2-SiO_2 glass with a CTE of $0.1x10^{-7}$ between 0°C and 300°C (page 1 line 8, table). A glass body with a CTE in a temperature range between 0°C

and 300°C, will also obviously have the same CTE in a temperature range between 20°C and 35°C, since it is encompassed. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the suggested CTE of Nordberg in the product of Clasen et al. in order to ensure dimensional accuracy over a desired range of temperatures when using the glass body. Regarding claims 10-11, Clasen et al. fail to disclose a sintering temperature above 1600°C to sufficiently melt crystalline phases. Nordberg teaches heating a titania containing silica body to a temperature of 1600°C or above, which is sufficient to melt crystalline phases, resulting in a transparent glass body. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the heating temperature of Nordberg in the process of Clasen et al. and Maxon et al. in order to produce a clear glass body.

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clasen et al. (2002/0026810) in view of Maxon et al. and Nordberg (2,236,059), as applied to claim 6 above, in further view of Fujiwara et al. (6,587,262). Although Clausen et al., Maxon et al. and Nordberg fail to disclose a specific size and shape of the glass body made, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the versatility of a sol gel method to produce a glass body of any desired shape and size. Fujiwara et al. teach a glass body to be finished into a photomask substrate that has a diameter of 7cm and a length of 26 cm, which is further finished and pressed to have a diameter of 23cm. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the dimensions of the glass body of Fujiwara et al. as an example for the dimensions to be

achieved from Clasen et al., Maxon et al. and Nordberg process in order to manufacture a photomask substrate.

7. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clasen et al. (2002/0026810), as applied to claim 12 above, in view of Maxon et al. (5,970,751), Nordberg (2,236,059), and Yoldas (4,278,632). Clasen et al. briefly disclose the prior art of Maxon et al. and Nordberg for making TiO_2-SiO_2 glass. Furthermore, Maxon et al. teach a process for making titania-containing silica powder by flame hydrolysis, which is collected in a cup and used for further processing (col. 2 lines 32-33). Similarly Nordberg teaches making titania-containing silica powder by flame hydrolysis (page 3 lines 42-58) as well as a desired titania content of about 9% to 11% (page 1 lines 40-50, table). Yoldas teaches a process for making a sol comprising titanium alkoxide and silicon alkoxide (example VI). Yoldas also teaches the desired for the sol to have a titania to silicon ratio of 10:90 (Example V). The 10% titania content of the sol is approximately equivalent to the titania content of the powder of Nordberg. As mentioned above, Clasen et al. disclose mixing TiO_2-SiO_2 powders, TiO_2, and SiO_2 together, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the titania content disclosed by Nordberg and the titanium to silicon ratio in the sol of Yoldas in the process of Clasen et al. in order provide for a homogenous sol.

8. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clasen et al. (2002/0026810), as applied to claim 1 above, in view of Seiko Epson Corp (Derwent Abstract of JP 62252330). Clasen et al. fail to disclose mixing with an

aqueous base and acid. Seiko Espon Corp. teaches a first solution of a precursor material with a basic reagent and second solution of the same precursor material with an acidic reagent prior to mixing the two solutions together. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the mixing of an acidic solution with the basic solution, as suggested by Seiko Epson Corp, in the process of Clasen et al. in order to properly hydrolyze the precursor material of titania containing silica powder of Clasen et al. and to achieved the desired pH of the sol.

9. Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clasen et al. (2002/0026810), as applied to claim 1 above, in view of Kirkbir et al. (5,473,826). Clasen et al. fail to disclose the use of a solvent for drying. Kirkbir et al. teach a solvent used for drying gels under hypercritical temperatures and pressures (col. 3 lines 55-63). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the drying solvent and conditions of Kirkbir et al. in the drying step of Clasen et al. in order to produce a gel free of cracks, as taught by Kirkbir et al.

10. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clasen et al. (2002/0026810) in view of Kirkbir et al. (5,473,826), as applied to claim 16 above, in further view of Blackwell et al. (5,154,744). Clasen et al. and Kirkbir et al. fail to disclose the further heating of the gel in halide gas. Balckwell et al. teach sintering a titania-silica preform in the presence of helium and chlorine. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the

halide gas of Blackwell et al. in the heating step of Clasen et al. in order to provide an inert atmosphere for sintering the porous gel.

11. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clasen et al. (2002/0026810) in view of Kirkbir et al. (5,473,826), as applied to claim 16 above, in further view of Yoldas (4,278,632). Clasen et al. and Kirkbir et al. fail to disclose the further heating of the gel under vacuum pressure. Yoldas teaches a heating step comprising using a vacuum (example IV). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the vacuum pressure of Yoldas in the heating step of Clasen et al. in order to provide a denser glass body free of contamination while the pores of the gel are closed.

12. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clasen et al. (2002/0026810), as applied to claim 1 above, in view of Nakajima (English Abstract of JP 63123825). Clasen et al. fail to disclose a finishing step. Nakajima teaches finishing a sintered gel into a photomask substrate. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the finishing step of Nakajima in the process of Clasen et al. in order to provide a usable glass body utilizing the low CTE property of the glass.

13. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clasen et al. (2002/0026810) in view of Maxon et al. (5,970,751), Nordberg (2,236,059), and Nakajima (English Abstract of JP 63123825). Clasen et al. disclose a method comprising providing an aqueous sol including a solid phase of titania-containing powder, an alkoxide containing titanium, as well as an alkoxide containing silica ([0034],

[0043]), as indicated by the mixtures thereof, forming the sol into a titania-containing silica shaped gel having a homogenous distribution of titania ([0031], [0033], [0034], [0047]), drying the gel ([0048]), and heating to form a glass body ([0041]). Furthermore, Clasen et al. disclose making titanium oxide/silicate glass with a titania concentration of 7.4 wt%, but not specifically a powder. Maxon et al. disclose a process for making titania-containing silica powder, which is collected in a cup and used for further processing (col. 2 lines 32-33). Although Maxon et al. do not teach the titania content of the powder, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the powder making method of Maxon et al. to obtain the desired 7.4wt% titania content in the powder and subsequently the glass made from the powder, as disclosed by Clasen et al. in order to produce the desired low CTE in the finished glass body. In addition, Clasen et al. fail to disclose the use of a solvent for the drying step. Kirkbir et al. teach a solvent used for drying gels under hypercritical temperatures and pressures (col. 3 lines 55-63). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the drying solvent and conditions of Kirkbir et al. in the drying step of Clasen et al. in order to produce a gel free of cracks, as taught by Kirkbir et al. Furthermore, Clasen et al. fail to disclose a sintering temperature above 1600°C to sufficiently melt crystalline phases. Nordberg teaches heating a titania containing silica body to a temperature of 1600°C or above, which is sufficient to melt crystalline phases, resulting in a transparent glass body. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the heating temperature of Nordberg in the process of Clasen et al. in

order to produce a clear glass body. Clasen et al. do disclose making titanium oxide/silicate glass with a titania concentration of 7.4 wt%, but do not mention a CTE in the range of about +30ppb/°C to –30ppb/°C. Nordberg teaches a TiO_2-SiO_2 glass with a CTE of $0.1x10^{-7}$ between 0°C and 300°C (page 1 line 8, table). A glass body with a CTE in a temperature range between 0°C and 300°C, will also obviously have the same CTE in a temperature range between 20°C and 35°C, since it is encompassed. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the suggested CTE of Nordberg in the product of Clasen et al. in order to ensure dimensional accuracy over a desired range of temperatures when using the glass body. Although the glass body formed by the process steps of Clasen et al, Maxon et al., Kirkbir et al. and Nordberg do not specifically disclose an extreme ultraviolet optical element, it would have been obvious to one of ordinary skill in the art at the time the invention was made expect an extreme ultraviolet optical element to result from completing the process steps of Clasen et al, Maxon et al., Kirkbir et al. and Nordberg.

14. Claims 8 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clasen et al. (2002/0026810) in view of Maxon et al. (5,970,751), Nordberg (2,236,059), and Kirkbir et al. (5,473,826), as applied to claims 7 and 20 above, in further view of Hrdina et al. (Proceedings of SPIE, vol. 5037). Clasen et al. and Nordberg fail to disclose a variation of the CTE of less than about 10ppb/°C. Hrdina et al. teach a TiO_2-SiO_2 glass with a CTE variation of less than 10ppb/°C (section 3.1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize

small CTE variation of Hrdina et al. in the process of Clasen et al. in order to provide for a glass that meet the requirements of EUVL optics and photomask substrate applications, as taught by Hrdina et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Queenie Dehghan whose telephone number is (571)272-8209. The examiner can normally be reached on Monday through Friday 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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ERIC HUG
PRIMARY EXAMINER